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Forest Insect and Disease Management

5230
BIOLOGICAL
EVALUATION R2-76-11

WESTERN SPRUCE BUDWORM

Federal and State Lands
Colorado and Wyoming

OCTOBER 1976

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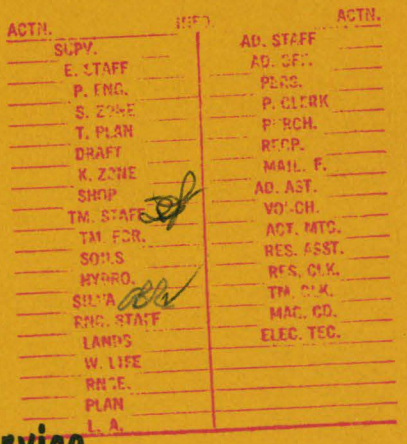

Rocky Mountain Region

U.S. Department of Agriculture Forest Service

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INTRODUCTION

Defoliation by the western spruce budworm on National Forests and other Federal lands was generally light in 1976. There was some localized moderate to heavy defoliation on the Roosevelt, Pike and San Isabel, and Grand Mesa-Uncompahgre and Gunnison National Forests. The visible defoliation on Federal lands is approximately 497,000 acres in Colorado and 20,500 acres in Wyoming. The primary host, Douglas-fir, is found most often along creek and river drainages and on north facing slopes. Predicted defoliation levels for 1977 are generally low. Damage from western spruce budworm is not a serious threat to Douglas-fir, true fir and spruce in Region 2, at the present time, although severe damage potential remains.

TECHNICAL INFORMATION

Casual Agent: Choristoneura occidentalis Freeman, western spruce budworm.

Host Trees: Pseudotsuga menziesii (Mirb,) Franco, Douglas-fir.

Abies concolor (Gord. and Glend.) Lindl., white fir.

Abies lasiocarpa (Hook.) Nutt, subalpine fir.

Picea engelmannii Parry, Engelmann Spruce.

Picea pungens Engelm., blue spruce.

Life HIstory: The western spruce budworm normally has one generation per year. Moths usually emerge in late July or early August. Shortly after emergence females mate and lay egg masses on needles. The eggs hatch in about 10 days. The larvae do not feed, but seek hiding places among lichens or under bark scales where they spin silken shelters (hibernacula) in which they remain dormant overwinter.

In the spring, the larvae migrate to the foliage where they mine the needles for 1 to 2 weeks. About the time the buds start to swell, the larvae move to the expanding buds. As the new shoots unfurl, the larvae spin loose webs between the new needles, within which they feed until the new foliage is entirely destroyed before feeding on older needles. Larvae become full grown in 30 to 40 days after attacking the buds. The larvae pupate either in existing webs, or in webs they spin in other areas of the tree. Adult moths are poor flyers, but may be carried great distance by air currents, thereby spreading the infestation.

Egg Mass Survey: Two 24-inch foliage samples were taken from the mid-crown of host trees at 42 locations in Colorado and Wyoming (see Table 2) on National Forest Service and BLM lands (1). A total of 420 trees were sampled. The foliage samples were transported to Denver and stored in a walk-in cooler until they could be examined. Percent defoliation of the new growth, on 1976 produced foliage on each sample was estimated and recorded (2). Each egg mass was examined to determine if it was old or new. Results of the egg mass survey are summarized in Table 1. Predicted defoliation for 1977 is determined from McKnight's sequential sampling plan for western spruce budworm (3).

A list of areas sampled is given in Table 2, and the zones for each forest are shown on the attached map (Figure 1).

Acreage determination: Acreage and intensity of defoliation was determined from maps made of the infested areas during aerial survey flights, made in the spring, summer and fall of 1976. The acreage and intensity of defoliation is summarized in Tables 3 (Colorado) and 4 (Wyoming).

Forest zones: Areas on National Forests were delineated into zones where past defoliation has occurred and present or future defoliation can be expected. Reduction of a National Forest to separate zones eases the estimation as to where outbreaks of western spruce budworm may be expected.

RESULTS

Light defoliation was detected on the Arapaho and Roosevelt, San Juan, and the Pike and San Isabel National Forests (see Table 3). Moderate to heavy defoliation is present on the Arapaho and Roosevelt (54,000 acres), Pike and San Isabel (168,000 acres) and Grand Mesa-

Uncompahgre and Gunnison (8500 acres) National Forests. There are approximately 900 acres of moderate defoliation in the Rocky Mountain National Park. There are approximately 121,000 acres of State lands throughout Colorado which have moderate to heavy defoliation. Light to moderate defoliation was found on and around the Medicine Bow and Shoshone National Forests (see Table 4).

DISCUSSION

Defoliation by the western spruce budworm continues throughout most of Colorado and parts of Wyoming as a minor problem. Figure 2 shows areas of western spruce budworm defoliation in Colorado. There are a few areas of moderate to heavy defoliation of Douglas-fir. Loss of the foliage over a few years will kill trees. The budworm population, at its' present level, on National Forest land in Colorado and Wyoming is not a serious threat to most forest resources at the present time. Christmas tree production is being hampered by unsightly defoliation in parts of Colorado. Defoliation is also a problem to mountain home owners because of damage to their trees. Damage predictions for 1977 are generally low. Light damage is expected on most forest land, except on and around the Pike and San Isabel, Roosevelt and possibly the Grand Mesa-Uncompahgre and Gunnison National Forests. In the past, western spruce budworm has defoliated large acreages of spruce-fir forest. Monitoring of western spruce budworm populations is essential in order to recognize a potential hazard and to recommend appropriate corrective actions.

RECOMMENDATIONS

No control efforts are recommended for general use on forest lands. Monitoring of the western spruce budworm population on Federal lands will continue. Sevin 4 oil, Union Carbide Corporation of Salinas, California, is registered for western spruce budworm control for home owners and Christmas tree farms. The label should be followed precisely. Over application of the mixture may cause foliage burning. Private landowners should contact the Colorado or Wyoming State Forest Service for evaluation of defoliation on their lands.

REFERENCES

1. McKnight, M. E. 1968. The 24-inch branch as a sample unit for egg mass surveys of the western budworm. USDA, Forest Service. Research Note RM-122, Rocky Mountain Forest and Range Experiment Station.

2. McKnight, M. E. 1969. Estimating defoliation of Douglas-fir and white fir by the western budworm. USDA, Forest Service. Research Note RM-144. Rocky Mountain Forest and Range Experiment Station.

3. McKnight, M. E. et. al. 1970. Sequential sampling plan for western budworm egg mass surveys in the central and southern Rocky Mountains. USDA, Forest Service. Research Note RM-174, Rocky Mountain Forest and Range Experiment Station.

TABLE 1 1976 EGG MASS SURVEY

AREA	ZONE	No. SAMPLES	OLD EGG MASSES	NEW EGG MASSES (1)*	NEW MASS/SAMPLE	OLD/NEW RATIO	1976 DEFOLIATION (2)* PERCENT	1976 DEFOLIATION (2)* CLASS	PREDICTION FOR 1977 CLASS (3)*	PREDICTION FOR 1977 DEFOLIATION (4)*
Roosevelt	1	60	7	6	0.10	1:0.86	33.46	2 (2)	2	Light
National	3	20	4	0	0.00	1:0.00	33.12	2 (1)	2	Light
Forest	4	20	72	65	3.25	1:0.90	100.00	4 (4)	3	Heavy
Rio Grande N. F.	1	100	0	0	0.00	---	0.82	1 (1)	1	Undetectable
San Juan	2	60	5	18 (1)	0.30	1:3.60	31.96	2 (1)	2	Light
National	3	40	0	0	0.00	---	2.06	1 (1)	1	Undetectable
Forest	4	60	29	7 (1)	0.12	1:0.24	35.00	3 (2)	1	Light
	5	100	0	0	0.00	---	0.24	2 (1)	1	Undetectable
San Isabel	1	20	57	65 (2)	3.25	1:1.14	78.88	4 (1)	3	Heavy
National	2	40	20	41	1.03	1:2.05	42.44	3 (1)	2	Moderate
Forest	3	80	111	201 (5)	2.51	1:1.81	91.38	4 (2)	3	Heavy
	4	40	57	86 (10)	2.15	1:1.51	52.25	3 (1)	3	Moderate
Pike N. F.	1	80	20	23 (1)	0.29	1:1.15	48.69	3 (1)	2	Light
	2	60	99	175	2.92	1:1.77	77.17	4 (1)	3	Heavy
Jelm Mtn. Wyo. BLM	1	20	0	0	0.00	---	5.38	2	1	Undetectable
Medicine Bow N. F.	1	20	70	10	0.50	1:0.14	96.75	4	2	Light
Rocky Mtn. National Park	1	20	26	6	0.30	1:0.23	70.62	4 (3)	2	Light

Current Defoliation Delineation

Class	Percent Defoliation	Classification
1	0 - 5%	Undetectable
2	5 - 35%	Light
3	35 - 65%	Moderate
4	65 - 100%	Heavy

Class Limits for the Sequential Sampling for Western Spruce Budworm Egg Mass Surveys

Class	New Egg Mass/24" Branch	Detection, Prediction
1	0.250 or Fewer	Undetectable
2	0.275 to 1.0	Undetectable in static, Light in Increasing
3	1.5 to 5.0	Light in static, moderate in Increasing
4	5.5 or More	Moderate or Heavy

*1 - Number in Parentheses - Number of parasitized egg masses
*2 - Number in Parentheses - 1975 prediction
*3 - From New Egg Mass/24" Branch Ratio
*4 - Class Prediction weighted from Old/New Ratio and Percent Defoliation

TABLE 2 WESTERN SPRUCE BUDWORM EGG MASS SURVEY SAMPLE SITES - 1976

ROOSEVELT NATIONAL FOREST

Zone 1 - Left Hand Creek, Jamestown, South Saint Vrain

Zone 2 - Narrows

Zone 4 - Sugarloaf

RIO GRANDE NATIONAL FOREST

Zone 1 - Beaver Creek Picnic Ground, Park Creek, South Fork Guard Station, Metroz Lake, Upper Beaver Creek

SAN JUAN NATIONAL FOREST

Zone 2 - Coon Creek, Electra Lake, Haviland Lake

Zone 3 - Red Creek, Transfer Creek

Zone 4 - Old Timer Campground, Pine River Campground, Vallecito Campground

Zone 5 - Cimarrona Campground, East Fork Campground, Sand Creek, Silver Falls, Wolf Creek Campground

SAN ISABEL NATIONAL FOREST

Zone 1 - Oak Creek Campground

Zone 2 - Alvarado Picnic Ground, Hamden Creek Picnic Ground

Zone 3 - Florence Picnic Ground, Ophir Creek, Pass Creek, Saint Charles

Zone 4 - Boy Scout Camp, Indian Creek

PIKE NATIONAL FOREST

Zone 1 - Devil's Kitchen, Hotel Gulch, Monument Creek, Mount Deception, Trail Creek

Zone 2 - Devil's Head, Indian Creek Guard Station, Thomas Hill

MEDICINE BOW NATIONAL FOREST

Zone 1 - Sheep Mountain

ROCKY MOUNTAIN NATIONAL FOREST

Zone 1 - Fern Lake

BUREAU OF LAND MANAGEMENT

Zone 1 - Jelm Mountain (Wyoming)

TABLE 3 WESTERN SPRUCE BUDWORM DAMAGE-ACREAGES FOR COLORADO LANDS

	Light	Medium	Heavy
State and Private	10,280	54,080	66,920
Bureau of Indian Affairs	880	1.520	-
Bureau of Land Management	6,150	15,060	5,030
National Park Service	5,460	880	-
Arapaho and Roosevelt National Forests	115,680	50,920	2,880
Grand Mesa-Uncompahgre and Gunnison National Forests	1,040	1,960	6,520
Pike and San Isabel National Forests	36,800	70,800	96,920
Rio Grande National Forest	3,250	2,750	520
Routt National Forest	200	480	-
San Juan National Forest	20,300	44,000	7,020
TOTALS	200,040	242,450	185,810

Total Land Defoliated	Federal	497,020
	State and Private	131,280
	TOTAL	628,300

TABLE 4 WESTERN SPRUCE BUDWORM DAMAGE ACREAGES FOR WYOMING LANDS

	Light	Medium	Heavy
State and Private	640	1,120	640
Bureau of Land Management	1,520	880	320
Medicine Bow National Forest	5,920	8,360	-
Shoshone National Forest	1,280	2,240	-
TOTALS	9,360	12,600	960

Total Land Defoliated	Federal	20,520
	State and Private	2,400
	TOTAL	22,920

COLORADO

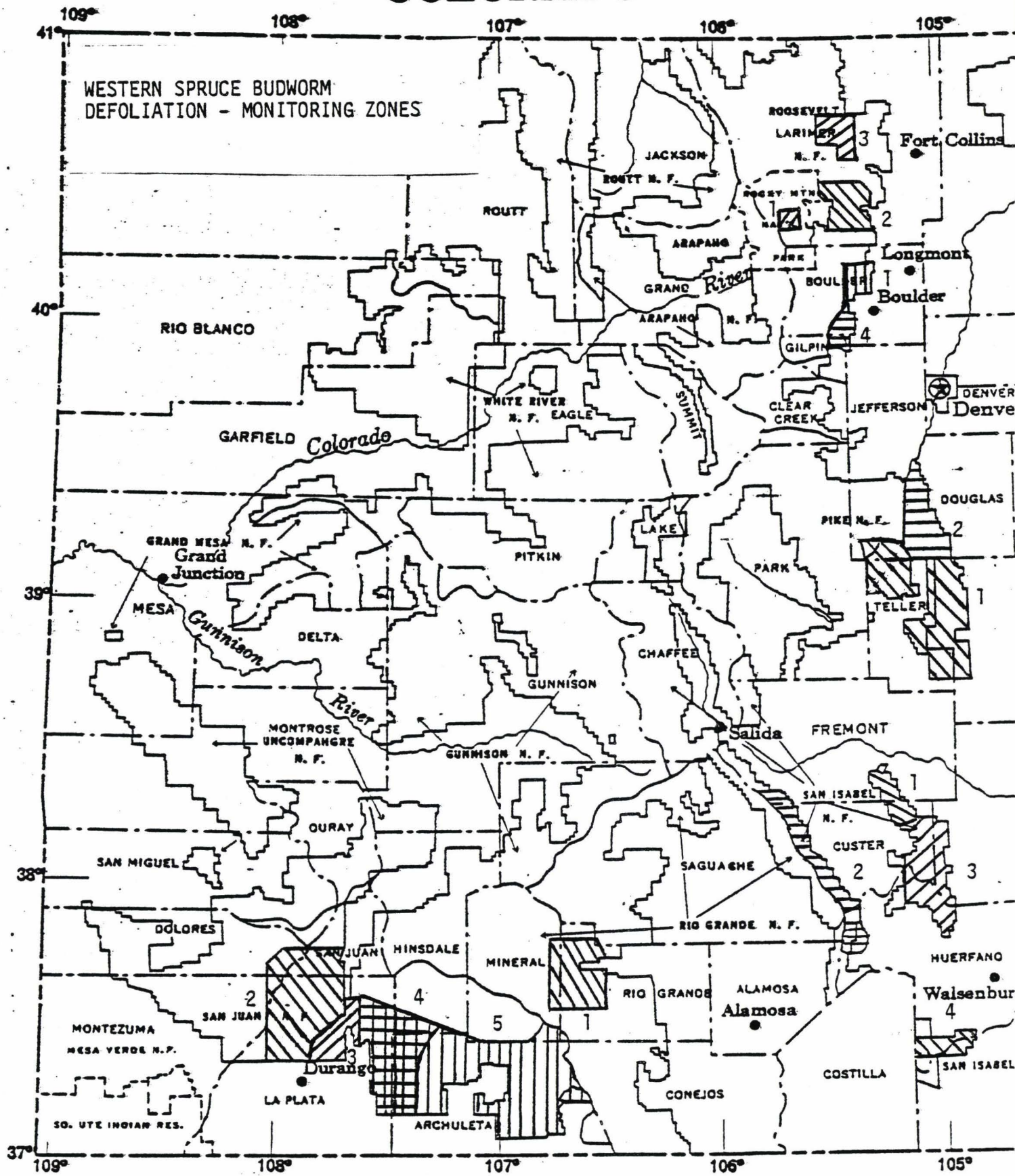

FIGURE 1

COLORADO

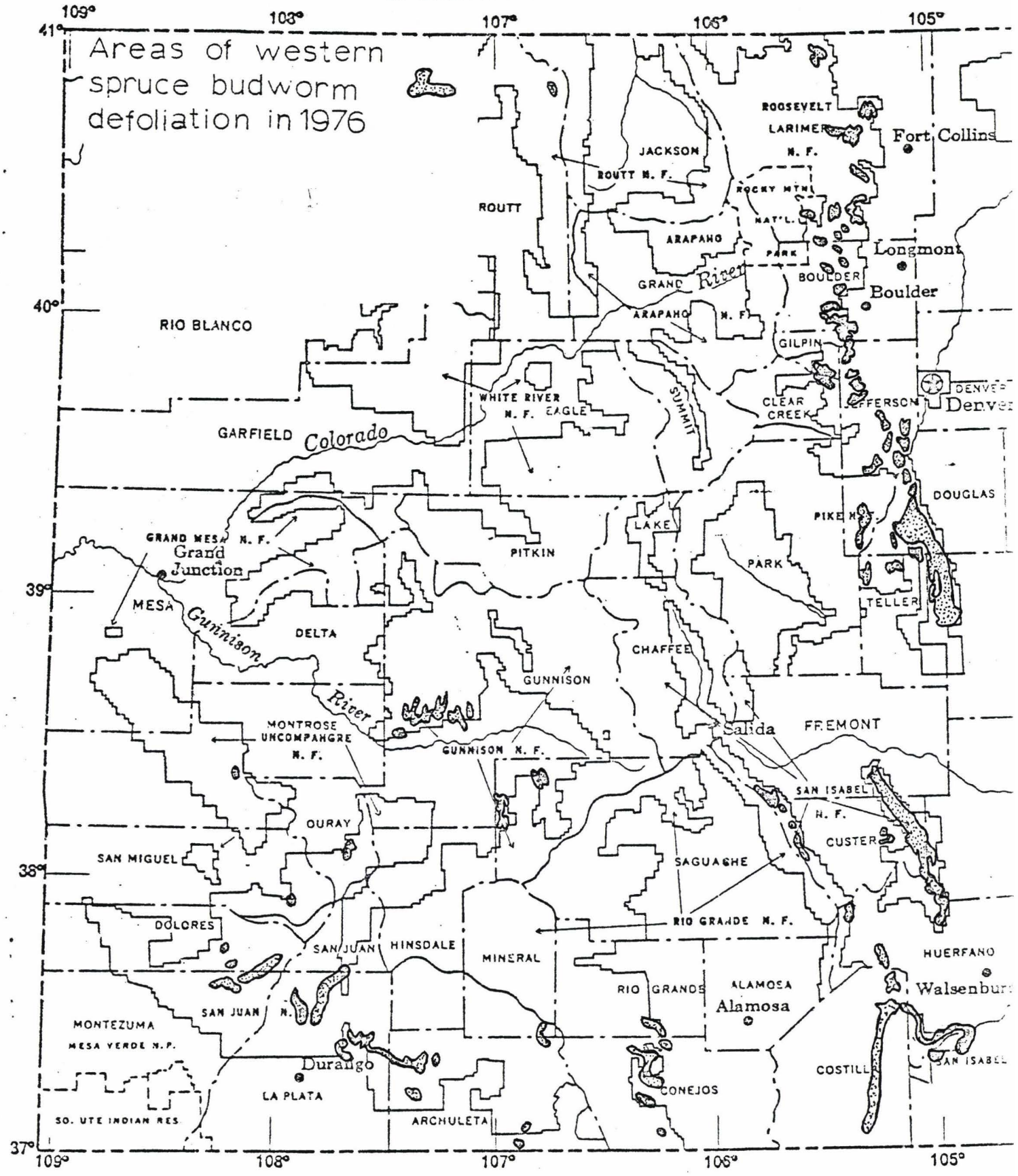

FIGURE 2

WYOMING

WESTERN SPRUCE BUDWORM
DEFOLIATION - MONITORING ZONES

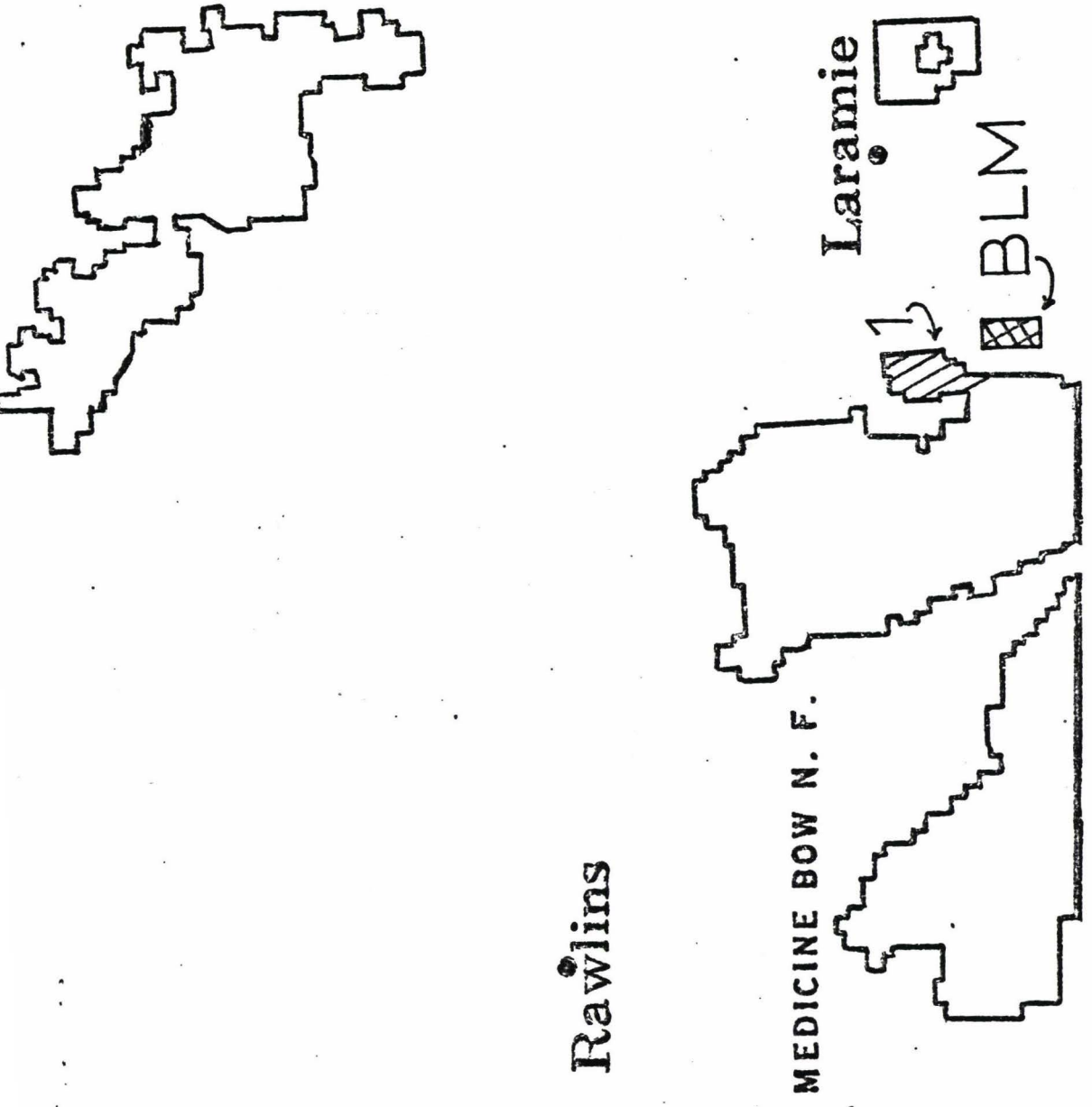

FIGURE 3

PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key -- out of the reach of children and animals -- and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U. S. Department of Agriculture, consult your county agricultural agent or State Extension specialist to be sure the intended use is still registered.